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APPLICANT: THE TIMKEN COMPANY
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FOR: SPEED SENSOR AND METHOD OF ATTACHING THE SAME

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WRITTEN REPLY

This paper responds to the Written Opinion mailed from the European Patent Office on 15 March 2004 in connection with the above-designated international patent application. Applicant submits herewith a new set of claims containing claims 1-15 and requests that it be substituted for the set of claims presented in the application as published under International Publication Number WO 2004/00815 A1. Applicant further requests a detailed substantive examination of the application with the new set of claims. Only claim 1 of the new set stands in independent condition.

The Written Opinion defers to the International Search Report, reflecting that all of the original claims do not meet the criteria set forth in Article 33(1) PCT. Indeed, the search report concludes that all of the original claims lacked novelty in view of German Offenlegungsschrift DE 100 34 844 A1. That German language reference corresponds to U.S. patent 6,453,732 (Delphi Technologies), which is in the English language and is submitted herewith. The Delphi reference shows a sensor 12 having a body 16 provided with a sensor tip 18. The sensor 12 is carried by a side-mount bracket 26 provided with a slot 28 through which a screw 32 extends. The screw 32 threads into a hole 34 in an engine block 22 and secures the bracket 26 and the sensor 12 firmly

against a mounting surface 36 on the engine block 22. The screw 32 does not bear directly against or even contact bracket, but instead bears against a serrated washer 30, the serrations of which embed in the bracket 26 along the walls of the slot 28, thereby securing the washer 30 to the bracket 26 in a fixed position on the bracket 26. Thus, when the screw 32 is removed to release the bracket 26 and sensor 12 from the block 22, the washer 30 remains with the bracket 26 so that the bracket 26 may be reinstalled with the same screw 32 on the block 22 in the same location. The Delphi reference also shows several other devices which in one way or another embed in or clamp down on the bracket 26, once the screw 32 is tightened, so that the device, whatever it is, assumes a fixed position on the bracket 26.

New claim 1 calls for a sensor and screw in combination, and specifies that the sensor has a housing which carries a sensing element. The claim also specifies that the housing contains a slot, and that along the slot it is formed from a material with which the screw itself, when in the slot, will interfere and impart a permanent deformation to the housing. The claim goes on to recite that the deformation, when made, is configured to receive the screw such that the deformation will serve to always locate the housing in the same position on a supporting structure.

Whereas the mounting system of the Delphi reference requires a washer or some other device which the screw drives into the bracket, the claim calls for only a screw to secure the housing to a mounting surface. Indeed, the claim specifies that the housing along the slot is configured such that the screw itself will interfere with the housing and create an indentation. The Delphi reference does not suggest this concept, and indeed shows a bracket that remains virtually unaltered by the screw. One reviewing the Delphi reference would conclude that an additional element, such as a serrated washer, is necessary to secure the sensor in a manner that it can be reinstalled in the same position. That washer or other element increases to the cost of the sensor,

provides a component that is easily misplaced, and adds to the complexity of initially installing the sensor.

Hence, claim 1 defines a combination sensor and screw which is both novel and characterized by an inventive step.

Claims 2-15 depend from claim 1 and are believed to set forth mechanical combinations – and processes – which are both novel and possessive of an inventive step. In this regard, claims 11-15, while they depend from claim 1, are directed to the process of installing the sensor initially (claims 12-15) or reinstalling it (claim 11).

In view of the foregoing, a detailed substantive examination of new claims 1-15 and a favorable preliminary examination report are respectfully requested.

Respectfully submitted,

Edward A. Boeschenstein
Reg. No. 22,986
Polster, Lieder, Woodruff & Lucchesi, L.C.
12412 Powerscourt Dr. Suite 200
St. Louis, Missouri 63131, USA
Phone (314) 238-2400
Fax (314) 238-2401

Claims

1. A sensor in combination with a screw having a threaded shank and a head at one end of the shank for securing the sensor in a fixed position on a supporting structure located adjacent to a rotating target, said sensor comprising:

a housing having at least one slot configured to receive the screw and along the slot being formed from a material with which the screw itself, when in the slot, will interfere and impart a permanent deformation to the housing, such that the deformation, once formed, can receive the screw and thereby enable the sensor to be located in the same position on the supporting structure if it is removed; and

a sensing element located in the housing and being capable, in response to rotation of the target, of producing a signal that reflects the angular velocity of the target.

2. The combination according to claim 1 wherein the housing has a front face; wherein the slot opens out of the front face; and wherein the deformable material forms a rim along the slot, with the rim projecting beyond the front face.

3. The combination according to claim 2 wherein the rim on the housing has an indentation that is capable of receiving the head of the screw.

4. The combination according to claim 2 wherein the rim contains an indentation and the head of the screw is received in the indentation.

5. The combination according to claim 1 wherein the housing has a front face and a back face; wherein the slot opens out of both faces and has side walls which taper downwardly toward the back face so that the slot is wider at the front face than it is at the back face; and wherein the deformable material is located along the side walls of the slot.

6. The combination according to claim 5 wherein the housing has indentations which open out of the tapered side walls of the slot and are configured to receive the shank of a screw.

7. The combination according to claim 1 wherein the housing within its deformable material at the slot contains an indentation suitable for receiving the screw.

8. The combination according claim 1 wherein the slot is one of two slots in the housing and the slots are parallel; and wherein the screw is one of two screws, with each screw being in a different slot.

9. The combination according to claim 1 wherein the housing includes a sacrificial extension which projects beyond the sensing element a prescribed distance to establish a known air gap between the target and the sensing element.

10. The combination according to claim 1 and further comprising the supporting structure, with the supporting structure having a mounting surface and a hole which opens out of the mounting surface, wherein the target rotates adjacent to the mounting surface; wherein the housing of the sensor is against the mounting surface and is oriented such that the sensing element is presented toward the target; and wherein the screw extends into the hole in the supporting structure.

11. A process for removing and reinstalling the sensor set forth in claim 10, said process comprising:

removing the screw from the hole;

withdrawing the sensor from the mounting surface;

thereafter placing the housing of the sensor against the mounting surface with the slot aligned with the hole; and

inserting the screw into the slot in the housing and into the hole in the supporting structure such that the screw is received in the indentation in the housing; whereby the sensor assumes its former position on the supporting structure.

12. A process for installing, with the screw of claim 1, the sensor of claim 1 against a mounting surface on the supporting structure adjacent

to the rotating target, with the supporting structure having a hole that opens out of the mounting surface and the mounting surface being located at a substantial angle with respect to the axis of rotation for the target, said process comprising:

placing the housing of the sensor against the mounting surface with its slot aligned with the hole in the supporting structure and with the sensing element being presented toward the target at a prescribed distance from the target;

placing the screw in the slot and aligning it with the hole; and

with a surface on the screw itself, creating an indentation in the housing, which indentation receives the screw such that the screw fixes the position of the housing on the supporting structure and prevents the housing from being displaced with respect to the target.

13. A process according to claim 12 wherein the head of the screw creates the indentation.

14. The process according to claim 12 wherein the shank of the screw creates the indentations in the side wall of the slot.

15. A process according to claim 12 wherein placing the housing against the mounting surface with the sensing element being presented toward the target at a prescribed distance from the target includes placing a sacrificial extension on the housing against the target, and the indentation is created with the sacrificial extension being against the target.